

[54] GUARDED RAZOR EDGE APPARATUS

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[56] **References Cited**

UNITED STATES PATENTS

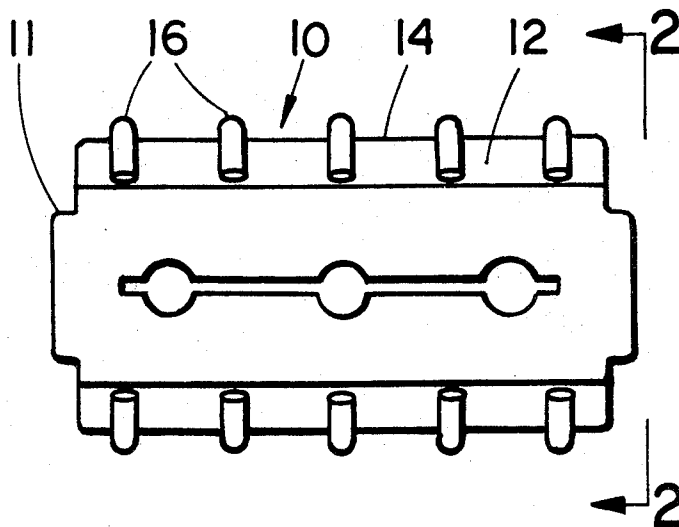
919,888	4/1909	Korper.....	30/76 X
1,846,622	2/1932	Thompson.....	30/346.58 X
3,263,330	8/1966	Ferrara.....	30/78 X

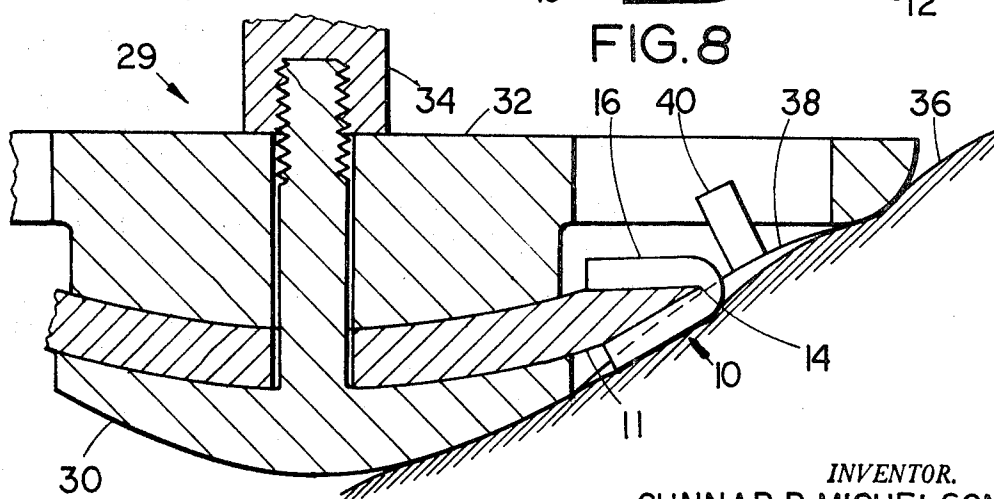
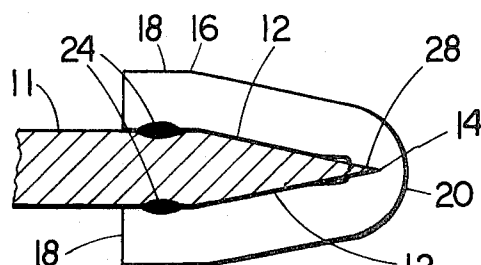
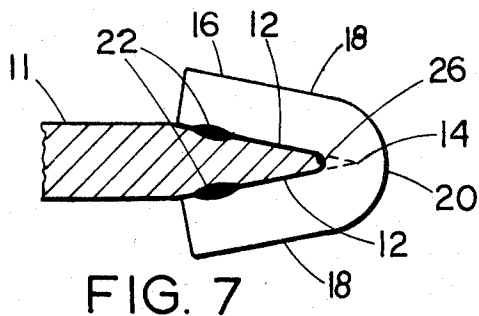
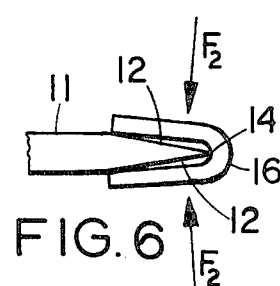
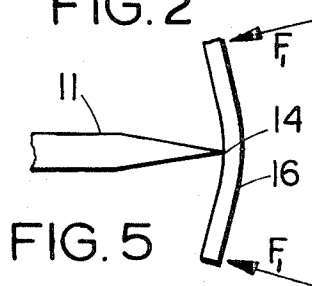
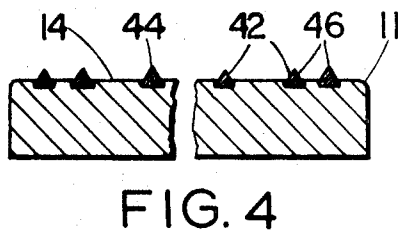
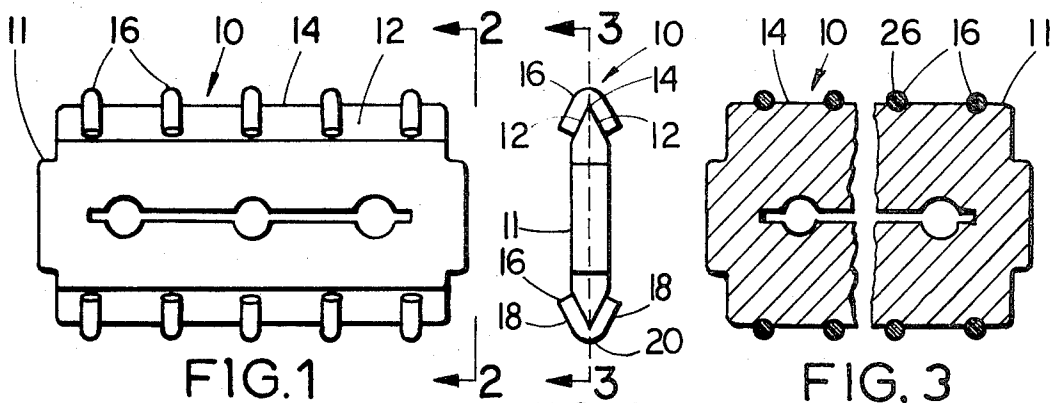
[57] **ABSTRACT**

A razor blade has a guarded cutting edge comprising a multiplicity of relatively short and thin guard members bent into relatively V-shaped form and permanently secured in substantially equidistantly spaced relation to the blade edge.

A method for applying the guard members to the blade edge uses guard members having a hardness which is less than that of the blade edge. The guard members are bent over the blade edge using the relatively greater hardness of the blade edge to slightly deform the guard members and thereby clamp them to the blade edge.

14 Claims, 9 Drawing Figures





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GUARDED RAZOR EDGE APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to razor blades, and more particularly to a razor blade with a guarded cutting edge which reduces the chances of cutting the skin during shaving.

2. Description of the Prior Art

In the past, safety guards have been applied to the cutting edges of razor blades to reduce the chances of cutting the skin during shaving. The prior art safety guards ordinarily include a plurality of longitudinally spaced metal segments or guard members protruding forward of the blade cutting edge to shield the skin from the cutting edge during shaving. Some prior art safety guards have been unsatisfactory because they are costly to manufacture on a large scale. Others have been unsatisfactory because they can only be used in combination with a specifically constructed razor blade holder. However, the chief disadvantage of the prior art safety guards is their inability to significantly reduce the chances of cutting. For example, the guard members of some prior art safety guards are relatively fragile and are not supported in a direction parallel to the blade cutting edge. During shaving, forces ordinarily occur in a direction parallel the blade cutting edge, and these forces tend to deform the guard members. Since the guard members are relatively fine, they tend to move relative to the blade cutting edge during shaving, thereby altering the spacing between them. In addition, the guard members often become damaged or cut during shaving. Other prior art safety guards do not have their guard members spaced properly to prevent the chances of cutting. For example, some of the prior art guard members are spaced relatively far apart, essentially because of the belief that a substantially large number of guard members impairs shaving efficiency. Large spacing between guard members, however, causes the skin to bulge excessively between the members, which can result in cutting of the skin. Some prior art safety guards function merely as spacers, for maintaining a vertical space between the longitudinal cutting edge of the blade and the body of the blade holder mechanism. These safety guards keep the blade spaced a slight distance away from the skin during use, but cutting of the skin can still result rather easily when holding the blade at certain angles relative to the skin, or when the blade is drawn across the face in a direction parallel to the blade cutting edge.

SUMMARY OF THE INVENTION

The apparatus of this invention provides a razor blade with a guarded cutting edge that significantly reduces the chances of injury to the skin during shaving. The structure of the cutting edge is relatively simple, and therefore can be manufactured at a relatively low cost. Moreover, the razor blade can be used interchangeably with conventional razor blades in a conventional razor blade holder.

Briefly, the guarded cutting edge contemplates an elongated razor blade edge, and a multiplicity of relatively thin elongated guard members bent into substantially V-shaped form and fitted over the blade edge. The guard members are spaced substantially equidistantly along the length of the blade edge. Each V-

shaped guard member has a pair of relatively short, elongated ends converging at a rounded corner section, and the rounded corner sections protrude forward of the blade edge. The respective ends of the guard members are permanently secured in close proximity to the blade edge to provide an effective means of support for the guarded members. Preferably, the respective corner sections of the guarded members are permanently secured to the blade edge to provide additional means of support.

In the preferred form of the invention, the ends of the guard members are secured either to respective flanks of the blade cutting edge or very close thereto. Preferably, the guard members are supported laterally along the length of the blade edge by producing a tight friction fit between the inner contour of the corner sections of the guard members and the blade edge.

This invention further contemplates a method of constructing a guarded razor blade cutting edge which includes a multiplicity of relatively short and thin, deformable filaments longitudinally spaced along the blade edge of a razor. The method contemplates that the hardness of the blade edge is greater than that of the filaments, and includes the steps of supporting each filament in a relatively straight form substantially perpendicular to the blade edge of the razor, and moving the supported filament and blade edge relative to each other to bend the filament over the blade edge, using the relative hardness of both to slightly deform the filament to thereby clamp it to the blade edge. The end portions of the filament are then secured in close proximity to the blade edge.

The guard members contemplated by this invention are held rigidly in contact with the razor blade edge during the shaving, because of the support provided at their ends. As a result, movement of the guard members relative to the blade edge during shaving is substantially prevented. Furthermore, the support means permits the guard members to be made relatively thin which improves the quality of the shave. In use, when the guarded cutting edge of this invention is pressed against the skin, the skin bulges between the protruding corner sections of the guard members toward the razor blade edge. The guard members contemplated by this invention may be configured and arranged, depending upon a user's beard and skin characteristics, so that the bulging skin between each of the guard members barely touches the blade edge when moderate pressure is applied to the razor blade holder mechanism. Thus, the chances of cutting the skin are substantially prevented, regardless of the cutting angle of the blade edge, and even though the blade is accidentally drawn across the skin in a direction parallel to the blade cutting edge.

BRIEF DESCRIPTION OF THE DRAWINGS

The features of specific embodiments of the best mode contemplated of carrying out the invention are illustrated in the accompanying drawings, in which:

FIG. 1 is a schematic plan elevation of a conventional safety razor blade with the guarded cutting edge of this invention;

FIG. 2 is an end elevation taken on line 2—2 of FIG. 1;

FIG. 3 is a schematic sectional elevation taken on line 3—3 of FIG. 2;

FIG. 4 is a schematic sectional elevation showing an alternative embodiment of the guarded members of FIG. 3;

FIGS. 5 and 6 are fragmentary end elevations of a razor blade edge and guard member at various stages of the method contemplated by this invention;

FIGS. 7 and 8 are fragmentary end elevations of a razor blade edge and guard member illustrating alternative forms of the method; and

FIG. 9 is a fragmentary sectional end elevation of a conventional razor blade holder and a safety razor blade with the guarded cutting edge.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIGS. 1 through 3, a guarded cutting edge 10 is formed along each side of a conventional double-edged safety razor blade 11. A pair of elongated flanks 12 integral with the sides of razor 11 converge outwardly to an elongated blade edge 14. Cutting edge 10 further includes a multiplicity of relatively short and thin guard members 16 bent into substantially V-shaped form and fitted over blade edge 14. The guard members are preferably spaced substantially equidistantly apart along the length of blade edge 14. As seen best in FIG. 2, each guard member 16 defines a pair of elongated ends 18 converging at a rounded corner section 20.

As contemplated by this invention, guard members 16 are relatively short in length and relatively thin in transverse cross-section. Further, the guard members are spaced relatively close to each other along the length of blade edge 14. This cutting edge configuration is not readily apparent from the drawings because for clarity reasons, the drawings are not shown to scale. In particular, guard members 16 are shown greatly exaggerated in size and reduced in number. The invention contemplates that the actual width of guard members 16 and the actual length of the spacing between the guard members both vary depending upon the thickness of a user's beard and the user's particular skin characteristics. The basis for choosing a suitable blade cutting edge configuration is hereinafter described. However, an appreciation of the dimensions of the invention can be had at this point by realizing that an average whisker of a beard is approximately 0.004 inch thick. A practical range of dimensions for guard members 16 is about 0.0015 to 0.008 inch for the diameter of the guard member, and about 0.03 to 0.06 inch for the length of guard member 16 before bending. It has been found that a substantial number of guard members can be secured to a razor blade edge without significantly impairing shaving efficiency, and that such an arrangement of guard members substantially reduces the chances of cutting during shaving. A practical range for the spacing between guard members 16 is about 0.015 to 0.08 inch. It is to be understood that these dimensions are given by way of example only, and that deviations from these dimensions are possible without departing from the scope of this invention.

As seen best in FIGS. 7 and 8, guard members 16 are held permanently in contact with blade edge 14 by welding the respective ends 18 of the guard members to corresponding flanks 12 of blade edge 14. FIG. 7 shows each end 18 of guard member 16 secured to a flank 12 by a weld 22 placed close to the upper edge of each flank 12. FIG. 8 shows an alternative configura-

tion wherein each end 18 of guard member 16 is secured to blade 11 by a weld 24 placed slightly beyond the upper edge of each flank 12. Besides welding, an alternative means for securing guard members 16 to blade edge 14 includes brazing, soldering, or bonding. As seen best in FIG. 3, the respective front ends of guard members 16 are supported in a lateral direction parallel to the blade edge 14 by placing each of them in a respective shallow notch 26 formed in blade edge 14. When guard members 16 are secured to blade edge 14, the guard members are maintained in a rigidly fixed position relative to the blade edge during shaving. Thus, the guard members are able to withstand normal laterally directed forces resulting during shaving operations without being damaged or deformed relative to blade edge 14. Consequently, the spacing between the guard members is maintained relatively uniform during shaving.

A method for providing lateral support for guard members 16 contemplates using the blade edge 14 of razor 11 as a male bending die. The method includes the steps of supporting guard members 16 in a straight form substantially perpendicular to blade edge 14, and then bending the blade members around blade edge 14. This method allows the depth of notches 26 to be controlled by an appropriate choice of factors such as: (1) the hardness of blade edge 14; (2) the hardness of guard members 16; (3) the included angle between blade edge flanks 12; and (4) the direction, symmetry, and lever arm of the applied bending forces. The guard member 16 has a hardness less than that of the blade edge. If the guard member is relatively hard compared with the blade edge, and if a small included angle exists between flanks 12 of cutting edge 14, a large bending force at a short bending arm produces a relatively deep notch in the blade edge. Since the included angle between the flanks of cutting edges of most conventional safety razor blades is rather small, the notches formed by this method can become so deep as to prevent guard members 16 from protruding a sufficient distance forward of blade edge 14.

FIGS. 5 and 6 show a preferred method for obtaining a relatively shallow notch in blade edge 14. The first step of the method is illustrated in FIG. 5, in which small bending forces F_1 are applied to the ends of guard member 16 in the directions illustrated by the arrows. A substantial component of each force F_1 is used to produce bending of guard member 16 from an initially straight position (not shown) perpendicular to blade edge 14 to the position shown in FIG. 6. The resulting force produced by guard member 16 on cutting edge 14 during this step is therefore relatively small. FIG. 6 shows the second step of the method wherein relatively large bending forces F_2 are directed substantially perpendicular to flanks 12 of cutting edge 14. Since the component of forces F_1 and F_2 directed against cutting edge 14 in the direction parallel to blade 11 is relatively small during the two steps illustrated in FIGS. 5 and 6, the notch 26 formed in blade edge 14 is relatively shallow, as shown in FIG. 7. The formation of the notch 26 is aided by an asymmetrical application of forces F_1 . FIG. 7 shows the final step of the method in which the ends of guard members 16 are welded to flanks 12 of cutting edge 14 by a weld 22.

FIG. 8 shows an alternative method for providing lateral support for guard members 16. This method contemplates using a guard member having a hardness

much less than that of blade edge 14, with a sufficiently large included angle between flanks 12 of blade edge 14. During the bending process for this method, symmetrical bending forces are used to bend guard members 16 over blade edge 14. The result of this method is that a notch 28 is formed at the inner contour of rounded section 20 of guard member 16 by the penetration of blade edge 14. Guard member 16 is thereby clamped tightly to blade edge 14.

FIG. 9 shows a conventional safety razor blade 11 with the guarded cutting edge 10 of this invention mounted in a conventional safety razor holder 29 which includes a bottom blade clamping member 30, a top blade clamping member 32, and an elongated upwardly extending handle 34. In use, when blade holder 29 is pressed against a skin surface 36, the skin bulges upwardly between each of the guard members 16 toward the portion of blade edge 14 between respective pairs of guard members 16, as shown by the upwardly bulging skin surface 38. By suitable choice of the size of guard members 16 and their spacing, depending upon the skin and beard characteristics of the user, moderate pressure applied to razor holder 29 against skin surface 36 can cause the skin surface 38 between guard member 16 to bulge a predetermined amount so that it barely, or not at all, touches blade edge 14. Thus, razor holder 29 can be drawn across the skin with sufficient pressure so that a whisker 40 is shaved off at skin surface 38. The chance of cutting the skin by the blade cutting edge 10 during shaving is thereby substantially prevented. Razor holder 29 can be drawn across the face at various angles relative to the skin, yet guard members 16 prevent blade edge 14 from penetrating into the skin far enough to cause cutting. In the event razor holder 29 is drawn across the skin in a direction parallel to blade cutting edge 10, the finely spaced guard members 16 substantially prevent blade edge 14 from penetrating the skin. This result is accomplished because the outwardly protruding guard members 16 are spaced very close to each other, with the result that the bulging of the skin between the guard members can be controlled by the pressure applied to razor holder 29.

Guard members 16 are relatively short, with the result that the ends 18 of the guard members are secured to the flanks 12 of blade edge 14 of razor 11, or very closely thereto. Thus, when the razor 11 is mounted for use in razor holder 29, the ends of the guard members do not interfere with clamping members 30 and 32, as seen in FIG. 9.

FIG. 4 shows an alternative form of the invention in which a multiplicity of relatively short and thin guard members 42 are secured to blade edge 14 of razor 11 in a manner similar to guard members 16. Guard members 42 are relatively triangular in cross-section with rounded outer corners 44. This configuration avoids injury to the skin in the same manner as guard members 16, but also results in a fewer number of whiskers or hairs being bent instead of being cut during shaving.

The guard members 42 can be constructed from pre-manufactured triangular wire. Alternatively, they can be formed into the triangular shape from conventional round wire. This is done by deforming the initially round wires in a corresponding set of rollers disposed in close proximity to the location where the guard members are permanently secured to the blade. This method eliminates the otherwise difficult problem of

orienting the guard elements and the blade about their respective longitudinal axes in relation to each other before permanently securing them to each other. A further advantage is that conventional round wires are less expensive and easier to procure than profile wires.

The end portions of blade edge 14 may occasionally be exposed to greater mechanical forces than its central portions during shaving. Thus, to reduce the chance of injury to the skin potentially inflicted by the end portions of the blade edge, outer guard members 46 at the end portions are spaced closer together than the remaining guard members 42, as shown in FIG. 4.

Teflon or other similar low-friction material is applied to guard members 16 to reduce skin-friction developed when moving blade cutting edge 11 over the skin during shaving. The coating may also cover the flanks 12 of cutting edge 14 in a manner well known in the art.

I claim:

1. In a safety razor blade having a flat base structure, and an elongated cutting edge integral with a side of the razor blade base structure, a guarded cutting edge comprising

a multiplicity of separate elongated metal thread-like guard members bent into substantially V-shaped form wherein each guard member defines a pair of relatively short ends converging at a rounded corner section, the guard members being fitted over the blade cutting edge and spaced substantially equidistantly apart along the blade cutting edge with their rounded corner sections protruding forward of the blade cutting edge, and

means for independently providing rigid and permanent attachment of the respective ends of each guard member to the razor blade base structure at points relatively close to the blade cutting edge to support the guard members in a substantially fixed relation relative to the blade cutting edge.

2. A guarded cutting edge according to claim 1 wherein the ends of the guard members are secured to the blade by spaced apart spot welds on each side of the blade edge.

3. A guarded cutting edge according to claim 1 wherein the edge of the razor blade base structure defines a pair of flanks converging outwardly to a point, and wherein the respective ends of each guard member are permanently secured to the respective flanks of the blade base structure.

4. A guarded cutting edge according to claim 1 wherein the guard members adjacent to the end portions of the razor blade base structure are spaced closer together than the remaining guard members.

5. A guarded cutting edge according to claim 1 wherein the guard members are provided with a low-friction coating.

6. A guarded cutting edge according to claim 1 including means for securing the respective corner sections of the guarded members to the blade edge, the securing means comprising a tight pressed fit formed between the inner contour of the corner section of each guard member.

7. A guarded cutting edge according to claim 6 wherein the pressed fit is formed by a notch formed at the inner contour of the corner section of each guard member for cooperation with the blade edge.

8. A guarded cutting edge according to claim 1 including means for securing the respective corner sec-

tions of the guard members to the blade edge, the securing means comprising a multiplicity of spaced apart notches in the blade edge for cooperation with the inner contour of the corner sections of the respective guard members.

9. A guarded cutting edge according to claim 1 wherein the width of the guard members is between about 0.0015 to 0.0050 inch.

10. A guarded cutting edge according to claim 1 wherein the spacing between substantially all guard members is between about 0.02 to 0.06 inch.

11. A guarded cutting edge according to claim 1 wherein the cross-sectional profile of the guard members is approximately triangular in shape with rounded corner sections.

12. In a safety razor blade having a flat base structure, and an elongated cutting edge integral with a side of the razor blade base structure, a guarded cutting edge comprising

a multiplicity of separate elongated metal thread-like guard members bent into substantially V-shaped form wherein each guard member defines a pair of relatively short ends converging at a rounded corner section, the guard members being fitted over the blade cutting edge and spaced substantially equidistantly apart along the blade cutting edge

with their rounded corner sections protruding forward of the blade cutting edge, each guard member having a diameter in the range of between about 0.0015 to 0.0050 inch, the spacing between adjacent guard members being in the range of between about 0.02 and about 0.06 inch, and

means for independently providing rigid and permanent attachment of the respective ends of each guard member to the razor blade base structure at points relatively close to the blade cutting edge to support the guard members in a substantially fixed position in which lateral movement of the guard members relative to the blade cutting edge during normal shaving operations is substantially prevented.

13. A guarded cutting edge according to claim 12 in which the effective length of each guard member is in the range of between about 0.03 and 0.06 inch.

14. A guarded cutting edge according to claim 12 wherein the edge of the razor blade base structure defines a pair of flanks converging outwardly to a point, and wherein the respective ends of each guard member are permanently secured to the respective flanks of the blade base structure.

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